What Is Claimed Is:

1. A tunable external cavity waveguide adapted for tuning a semiconductor laser, said tunable external cavity waveguide comprising:

a ferroelectric electro-optical substrate;

means for creating a waveguide in said substrate; and

a distributed Bragg reflector (DBR) for selecting a laser oscillation wavelength.

2. A tunable external cavity waveguide according to claim 1 wherein said substrate has an electro-optic coefficient of no less than r_{33} = 240 pm/V and a strain-optic coefficient which is positive.

3. A tunable external cavity waveguide according to claim 2 wherein said substrate has a strain-optic coefficient in the range of about 0.1.

4. A tunable external cavity waveguide according to claim 3 wherein said substrate comprises SBN.

5. A tunable external cavity waveguide according to claim 4 wherein said substrate comprises SBN:61.

6. A tunable external cavity waveguide according to claim 4 wherein said substrate comprises SBN:75.

7. A tunable external cavity waveguide according to claim 3 wherein said substrate comprises PLZT.

8. A tunable external cavity waveguide according to claim 3 wherein said substrate comprises $LiNbO_3$.

9. A tunable external cavity waveguide according to claim 3 wherein said substrate comprises $LiTaO_3$.

10. A tunable external cavity waveguide according to claim 3 wherein said substrate comprises $BaTiO_3$.

11. A tunable external cavity waveguide according to claim 1 wherein said waveguide is created in said substrate by inducing a compressive strain field within said substrate, wherein said compressive strain field creates a graduated variation in the index of refraction of said substrate.

12. A tunable external cavity waveguide according to claim 11 wherein said compressive strain field is created by depositing a layer of material on said substrate, wherein said layer of material deposited on said substrate has a different coefficient of thermal expansion than said substrate, and further wherein said layer of material is applied to said substrate at an elevated temperature and then allowed to cool.

13. A tunable external waveguide according to claim 12 wherein said substrate comprises a flat surface and said layer of material is deposited onto said flat surface, and further wherein a channel is formed in said layer of material after cooling.

14. A tunable external cavity waveguide according to claim 12 wherein said substrate comprises a ridge projecting out of a flat surface, and further wherein said layer of material is deposited onto said flat surface adjacent said ridge.

15. A tunable external cavity waveguide according to claim 1 wherein said substrate comprises a ridge projecting out of a flat surface, and further wherein a layer of material is

deposited onto said ridge, said layer of material having a larger index of refraction than said substrate, whereby said waveguide will be created in said substrate.

16. A tunable external cavity waveguide according to claim 1 wherein said substrate comprises a flat surface, and further wherein a layer of material is deposited onto said flat surface, said layer of material comprising a ferroelectric electro-optical material having a larger index of refraction than said substrate.

17. A tunable external cavity waveguide according to claim 1 wherein said waveguide further comprises phase control means for selecting a cavity mode.

18. A tunable external cavity waveguide according to claim 17 wherein said phase control means comprise means for applying a voltage difference across a portion of said waveguide.

19. An external cavity mirror cooperatively disposed with a semiconductor laser for directing a portion of the emitted laser light back into an optically active region of said semiconductor laser, said external cavity mirror comprising a substrate comprising a ferroelectric electro-optical material, a waveguide formed in said substrate, and an electro-optically tunable distributed Bragg reflector (DBR) formed on said substrate, wherein said portion of emitted laser light is directed back into said optically active region of said semiconductor laser as a function of a pre-determined external voltage difference that is selectively applied across said distributed Bragg reflector (DBR).

20. A semiconductor laser comprising:

an active section adapted to create a light beam by spontaneous emission over a bandwidth around some center

frequency, wherein said active section guides said light beam between an external cavity mirror bounding one end of said active section and a partially reflective mirror bounding an opposite end of said active section so as to create an emitted beam of laser light therefrom;

said external cavity mirror being cooperatively disposed with said semiconductor laser for directing a selected portion of said light beam back into said active section, said external cavity mirror comprising a substrate comprising:

a ferroelectric electro-optical material;

a waveguide formed in said substrate; and

a distributed Bragg reflector (DBR) formed on said substrate.